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## Earth Architecture in the World

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### Abstract

Earth architecture can be found almost anywhere but in our rush to make use of modern building methods, we have forgotten that it is still with us. Examples range from simple mud shelters to magnificent palaces. Earth for building is always beneath our feet and in time of economic distress, we can always turn to Mother Earth for shelter. The following photographs attempt to present the range and scope of earth architecture on a worldwide scale from modest shelter to monumental efforts, historically and at the present time. In these photographs, it is difficult to determine the basic core of the building, as it is often sheathed with more durable stone or stucco. If they seem to represent poverty or neglect, it is unintentional but mainly to show the underlying fabric. It is possible here to show only the tip of the iceberg. Look around you and you will find earth buildings where you least expect them. The current paper has shown the earth architecture and their samples in the world. The paper has shown the significant and development of earth architecture in the world.

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### 1. Earth Architecture in USA

The prehistoric peoples, the Spanish conquistadors and early pioneers throughout the West used Earth construction. It is still used today and is experiencing new popularity, partly by owner builders who use it for economy and forgiving technology and partly by architects, builders, and artists who create live-in sculptures for more luxurious homes. It had wide popularity in rural areas, even for schools, churches, and public buildings until World War II. The adobe brick mode is the most popular in the west today but many proponents of rammed earth are also building in this medium. While the buildings of eastern United States might seem more logically suited to more traditional wood, fired brick, stone and concrete, many of the early buildings were of earth. The damper climate limited the use of adobe bricks and made the use

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of rammed earth more feasible. Plantations of the South, private homes in Washington, F.C., churches and public buildings made use of this medium as well although few examples remain. The few examples shown here are among the survivors although there are many more. The U.S. Department of Agriculture sponsored research and built experimental buildings to demonstrate the feasibility during the depression of the 1930s. The advent of World War II and boom times that followed led to a decrease in efforts and research in this field. Figure 1 and Figure 2 have shown two samples of earth architecture in USA.



Fig. 1. Weddle Gilmore Rammed Earth, Arizona



Fig. 2. The Box Box House, USA

## 2. Earth Architecture in Europe

Architectural tradition in Europe is most often thought of in Gothic, Beaux Art, or modern styles but in many rural areas earth construction has been widely used for many centuries. France has an ongoing tradition of rammed earth (Pise), Germany has extent examples of monumental buildings of great age, and even England with its damp, humid climate has some. Figure 3 has shown various earth architecture cases in the United Kingdom.



Fig. 3. Eden Project, UK

### 3. Earth Architecture in the Middle East

The Middle East, which has some of the most hostile environments in the world, has spent thousands of years developing architectural forms employing mud brick. Lacking a supply of structural wood members, the ingenuity of the builders and architects was taxed to the utmost to create roof structures from small bricks. These vaulted forms have been found as early as 5000 B.C. Many of these exquisite forms have been forsaken for concrete or steel. Iran is an oldest country in earth architecture and earth building that is placed in Middle East. It is included many earth buildings in Yazd, Meybod, Kerman and various cities. The various systems and technologies were included in their buildings in Yazd, Kerman and Meybod such as Qanat, Earth Refrigerator (Yakhchal), Wind Catcher and etc that are good system in energy optimizations; it has shown the Iranian knowledge in earth building and earth architecture. Yemen is other country in Middle East that is included many earth buildings in there. Figure 4 and Figure 5 have shown various earth buildings in Iran.



Fig. 4. Pigeonnier in Meybod, Iran



Fig. 5. Dad Hotel in Yazd, Iran

#### 4. Earth Architecture in Asia

Earth architecture in Asia is included few countries such as China, Bangladesh, India and so on although the current research separate Middle East from Asia. The earth architecture and vernacular architectural traditions of China (Figure 2.39) are unrivalled in the various countries and world. Other countries don't have unbroken their tradition in earth architecture. China is a nation with 56 nationalities that are living in disparate natural landscapes with various climatic conditions but they are certainly more varied in its housing patterns than is the case in single nations such as the United States or even in comparison with multi-national Europe.

Loo Jian-Ling (2009) used adobe and the wattle-and-daub techniques in Perak in Malaysia (Figure 2.40). She used adobe and wattle-and-daub methods since when she learned about how quickly the mud walls would take to dry. To make adobe bricks, a mixture of clay, sand and rice husks were poured into a mould and left to dry out in the open. The 4in x 8in x 16in bricks took two to three weeks to dry compared to a week in Chiang Mai during the dry season. The wattle-and-daub technique involved weaving a frame out of bamboo strips and slapping globs of mud (clay-rich with rice straw) onto the frame (Figure 6). The frame held the structure up while the clay dried. The clay and bamboo were sourced on-site while the nipper thatch was supplied by local sources. Bamboo steamer baskets and vintage windows, recycled from old houses, were fitted into the wall to allow for ventilation although she used cement for the foundation and flooring.



Fig. 6. Mud house in Perak (Loo Jia-Ling, 2009)

## 5. Earth Architecture in Australia

Rammed earth is used higher than other types of earth buildings in Australia although they worked on Modern earth architecture and earth building in there. Australia has extent examples of rammed earth building that are included in good conditions. Figure 7 has shown the earth architecture's case in Australia although Australia has used modern earth architecture in their applications. They have used the earth buildings and specially rammed earth buildings in their applications.



Fig. 7. Wood Marsh Architects Design Rammed Earth House, Australia



## 6. Conclusion

The current paper is shown a review on various samples of earth buildings in the world. It has shown a good development of earth architecture and earth buildings in various countries. The current paper has shown the significant and development of earth architecture in the world.

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